REMARKS

1. The Examiner's entry of the amendment filed 9/1/04 is acknowledged.

2. The Examiner's restriction for examination purposes and withdrawal of previously submitted claims 29-41 is acknowledged, with traverse.

3. Applicant respectfully requests entry of amendments to claims 17, 27-29, 31-33, and 35-41, and cancellation of claims 1-16 and 30 without prejudice or disclaimer of the subject matter.

Applicant requests further examination of claims 27-41. All now incorporate the "metal" limitation from claim 17. Thus, claims 27-41 are no longer directed to a distinct laminate classified in a different subclass than the originally elected rubber-to-metal bonded article of claims 17-28. This amendment was suggested by the Examiner in the phone interview of January 26, 2005.

The amendments to the claims have antecedent basis in claim 1, 12-15, original claim 17, and the specification at: page 5 line 15-16, 24, 31; page 6 line 3, 10-20; page 7 line 1; and Drawing Figures 1 and 2.

Claims 38-41, previously directed to a torsional vibration damper ("TVD"), now are written in dependent form as special cases of the bonded article of claim 17, as discussed in the specification at e.g. page 8 lines 3-7. The rubber-to-metal bonded article of claim 17 is itself a final product, not an intermediate, albeit a very generic one.

4. Applicant acknowledges the Examiner's final rejection of claims 17-24 and 26-28 under 35 USC 102(b). Applicant submits the currently amended claim 17 with the language suggestive of process limitations removed. In its place the term "*press fit*" is used to describe the rubber member. Applicant submits that this clarifying limitation distinguishes the instant invention from the unvulcanized "pre-formed film" used in the vulcanization bonded articles disclosed by Drake et al, Nagel, and Ravagnani et al. The final product is distinct with respect to the structural differences implied by the term "*press fit*" and also with respect to the explicitly claimed structure of the resulting product.

5. Explicit Structural Difference. The product of the instant invention has the claimed distinguishing feature of "*said rubber member resides between said metal members in at least one of a neutral state and a state of compression at a temperature*

in the range of from about -20°C to about 120°C;". As explained in the specification at p. 2 lines 12-19, the prior art vulcanization-bonded products would necessarily and inherently have a rubber member residing in tension between two metal members at any temperature below the vulcanization temperature. Applicant's invention results in a bonded product having a rubber member residing between two metal members in at least one of a neutral state and a state of compression at a temperature in the range of from about -20°C to about 120°C, which is well below known vulcanization temperatures. This is the main structural difference between the prior art bonded articles and the instant invention: tension versus compression in the rubber member. This structural feature is explicitly included in claim 17. "*To reside*" is to exist – thus introducing a description of the state or structure of the rubber member, not a process. To reside in a state of compression, is a structural feature of the final product, not a process limitation.

The following quote from a classic textbook, regarding conventional vulcanization bonded torsion springs, which have an annular elastomeric or rubber body between two cylindrical metal members, describes the origin and importance of inherent tensile stresses in the prior art rubber.

> "*Shrinkage.* The volume of most elastomers changes *approximately* 0.047% per °C, or a total of about 6% from curing temperature to room temperature; however, other partially compensating volume change effects exist, and it is common practice to allow for about 5% shrink after cure. Where an elastomer is bonded over a considerable area to a metal which cannot move, and where the exposed elastomer area is relatively small, even this small amount of shrinkage may cause a damaged bond, voids or unrelieved tensile stresses in parts of the body.
>
> Some differences of opinion exist among authorities on the effect of tensile stresses produced during cooling, but in general it can be stated that uncorrected cooling tension is harmful and can result in a 20-50% reduction in the fatigue life for a torsion cycle (as compared with that of the same spring where the body is under compression)." P. K. Freakley, A. R. Payne, "Theory and Practice of Engineering with Rubber," ISBN 0853347727, Elsevier Science, (September 1978) at p 242.

These unrelieved tensile stresses are inherent in the prior art rubber-to-metal articles of the references cited by the Examiner (Nagel and Drake et al. and Ravagnani et al.). Therefore Applicant submits that residing "*in at least one of a neutral state and of a state of compression...*" is a structural feature of the final product that provides inherent structural benefits and that distinguishes the instant invention from the prior art.

6. Implied Structural Differences. Other structural differences are implied by *"rubber member press fit between... said"* metal members. Though the rubber member of the instant invention and that of the vulcanization bonded prior art will both ultimately be formed and vulcanized, the press fit rubber member will bear distinct signs of having been press fit between the two metal members, as opposed to the prior art, which will bear distinct physical signs of having been directly molded between its metal members. These signs in the directly molded prior art include flash (thin layers of rubber than flow through small cracks between the metal members and the mold), mold markings, and evidence of rubber shrinkage and flow. In the inventive articles there will lack of flash, no evidence of flow or shrinkage, different types of mold markings if any, and evidence of bulging from being pressed between the metal members. Moreover, if the article of the instant invention is disassembled, the press fit rubber member will be seen to spring back toward its pre-formed shape, while the prior art vulcanization bonded rubber will simply retract to relieve the tension. These structural differences from the prior art are inherent or implied results of the rubber being press fit. Prior art unvulcanized rubber simply can't be press fit because it would not support any residual stresses required to meet the common meaning of the term. This press fit term is made even more explicit in claims 27-29, 31-33 and 39 by adding the additional limitation that *"said cured rubber member is partially cured to a state of cure of from about 20% to about 99% in a shape-forming mold prior to assembly of said article"* (or other narrower ranges) and that *"said cured rubber member is substantially fully cured."* This should remove any doubt that the press fit rubber is indeed partially cured before assembly, thus acquiring all the implied structural differences above as well as explaining how the explicit structural difference of being in compression is obtained.

Applicant refers now to a portion of section 2113 of the MPEP.

> "The structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made, or where the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product. See, e.g., *In re Garnero*, 412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979) (holding "interbonded by interfusion" to limit structure of the claimed composite and noting that terms such as "welded," "intermixed," "ground in place," "press fitted," and "etched" are capable of construction as structural limitations.)" MPEP §2113.

The full quote from *Garnero*, is illuminating.

> "The trouble with the solicitor's approach is that it necessarily assumes that claim 1 should be construed as a product claim containing a process, *rather than structural, limitation*. However, it seem to us that the recitation of the particles as 'interbonded one to another by interfusion between the surfaces of the perlite particles' is as capable of being construed as a structural limitation as 'intermixed,' 'ground in place,' 'press fitted,' 'etched,' and 'welded,' all of which at one time or another have been separately held capable of construction as structural, *rather than process, limitations*." *In re Garnero*, 412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979) (emphasis added).

Claim 17 now describes a "press fitted" rubber member, which is distinct from a prior art vulcanization bonded rubber member. The term "press fitted" itself is capable of construction as a structural limitation *rather than a process limitation*, as quoted above. Thus, Applicant respectfully submits that because of a reasonable structural construction of the terms, claim 17 should not be construed as hampered with product-by-process limitations.

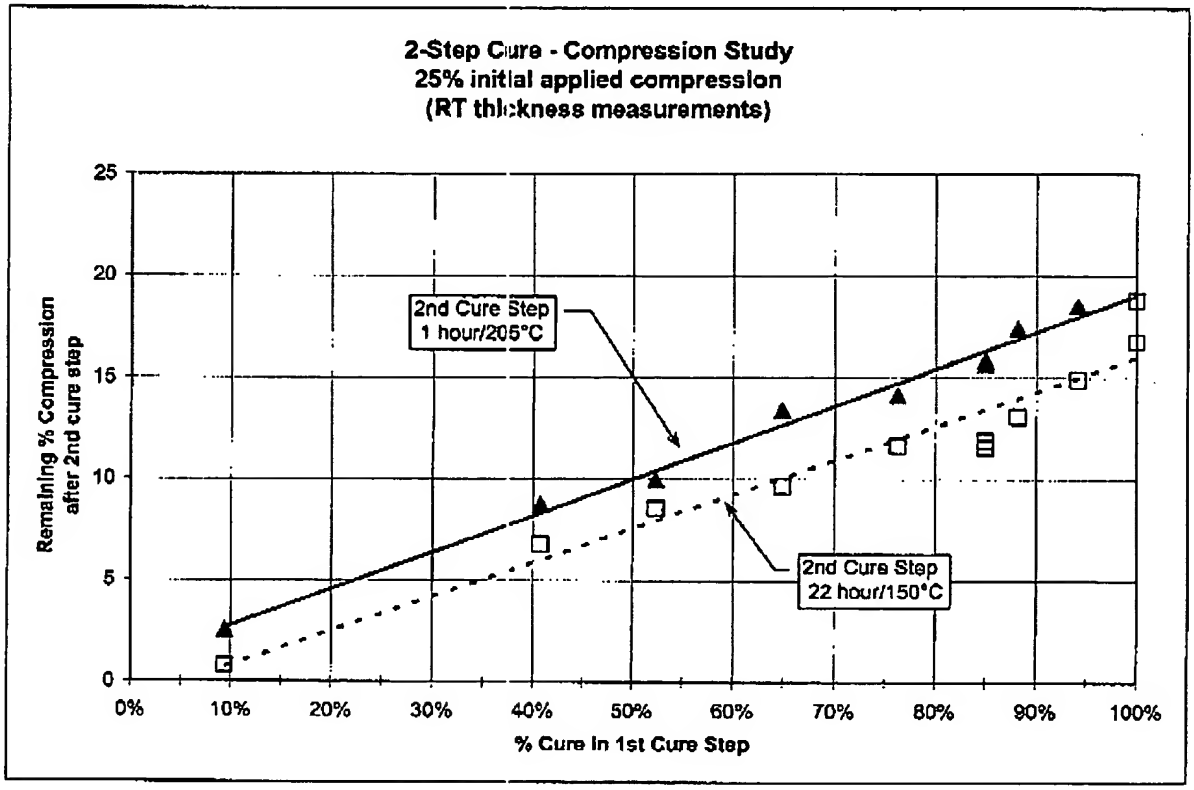
7. Applicant acknowledges the Examiner's final rejection of claim 25 under 35 USC 103(a) over Drake et al. Applicant submits that the currently amended claim 17, and therefore dependent claim 25, is now patentably distinct. Claim 17 recites a rubber member that is *"press fit"* and *"resides between said metal members in at least one of a neutral state and a state of compression at a temperature in the range of from about -20°C to about 120°C."* Drake does not teach use of a press fit rubber member to bond metal substrates, and Drake does not teach a rubber member that is not in a state of tension, nor is there any suggestion of these features. Drake's vulcanization bonded articles inherently comprise a rubber member with unrelieved tensile stresses as described above.

Additional Arguments for Amended claim 17 et al.

8. The Examiner, in the phone interview of April 4, 2005, suggested Applicant present data illustrating the compression effect obtained in articles as claimed. The chart below presents such data. The chart summarizes a series of experiments following ASTM D395 Method B in which an at least partially cured rubber button prepared as in Table 5 of the specification were placed between rigid metal plates and subjected to 25% compression and a subsequent second cure step. In order

to prevent adhesion to the metal plates, mold release was applied to the surfaces. Thus, the rubber buttons were easily removed after the second cure step was completed and the dimensions measured to determine the degree of compression strain remaining. The chart plots the percent remaining compression as a function of the per cent cure of the rubber button in the first cure step.

Note first the two possible extremes regarding first cure step. Prior art vulcanization bonding corresponds to 0% cure in the first cure step, which would yield exactly 0% compression if it could be done in this test. There would also be some shrinkage, of course. The other extreme of 100% cure in the first step represents the prior art post-vulcanization bonding technique which requires an adhesive to produce bonding in the second cure step. Applying a second cure step to a 100% cured piece of rubber is also the traditional "compression set" test of ASTM D395 Method B. Thus, it is expected that the full 25% initial compression should not retained even in this case.



Finally, consider the range of first step cures representing partially cured rubber. Sufficient compression is retained to make a useful article within the range from about

10% to 100% cure in the first step. Of course, the more remaining compression, the better. This data supports the limitation in currently amended claim 27 of "*a cure state of about 20% to about 99%*". This data shows that the compression limitation of claims 17 and 31 is a measurable structural feature that results directly from press fitting a partially cured rubber member between rigid metal members before completing the substantially full cure.

Regarding the other aspect of the invention affected by the first step cure, bonding without adhesive, data was presented in the specification in Illustration C at pages 25-26. There it was shown that excellent adhesion was obtained for first step cures in the range of about 50% to about 95%. The lower the per cent cure in the first step, the better the adhesion, so 20% cure in the first step is supported as the lower limit. The adhesion at 95% cure in the first step was still excellent, so 99% represents the reasonable belief of the Applicant as to the upper limit of the useful range of per cent cure in the first step.

9. The Examiner, in the phone interview of April 4, 2005, also suggested Applicant present amendments to bring the limitation of claim 26 somehow into claim 17. Thus claim 17 is currently amended to recite a first and second "*rigid metal member*". Claim 42 also recites a first and second "*rigid metal structural member*". The term rigid (by dictionary definition) means "stiff, firm, not bending" thus excluding the possibility of post-assembly metal-forming sufficient to put the rubber member in compression. This can be achieved in any number of ways disclosed in the specification. Cast iron (page 6 line 12, 20) is well known to be too brittle to bend, as are some other metals. Certain structures are clearly simply too rigid to bend, in particular the rigid I-beam structure of the embodiments of Drawing Figures 1 and 2 (reference numeral 12 and 19), as well as the massive metal pulley 14 of Figure 1. Thus affirmatively limiting the metal members to be "*rigid*" is equivalent to the negative limitation of claim 26 "*not the result of a post-assembly metal-forming step.*"

10. If claim 17 is now allowable, claims 18-41 should be allowable as dependent on claim 17, and further examination of claims 29-37 and 38-41 is respectfully requested.

Claim 18-26 were previously presented. Claim 27 depends on claim 17 and incorporates the limitation of claim 12 on the cure state of the rubber member before assembly.

Claim 28 incorporates a limitation from claim 1 and 12 that the rubber in the final article is substantially fully cured. Claim 29 incorporates the limitation of claim 18. Claim 31 limits the article of claim 17 (via claim 29) to have rubber in compression. Claim 32 recites a preferred range of cure state for the rubber member from claim 13. Claim 33 recites another preferred cure state range from claim 14. Claim 34 is copied from claim 21, but depends from claim 29. Claims 35-37 recite material limitations from claims 22-24.

Claim 38 is to an annular article, dependent on claim 17, as in the specification in Figs 1-3. The annular article is unique in that the resulting gap between the two metal parts is of fixed radial width. Therefore, if the metal is rigid, the gap does not change during handling, assembly, or press fitting the rubber into the gap. As long as the partially cured rubber member is thicker than the gap, it will be press fitted and reside in at least one of compression of tension at temperatures below cure temperature, especially if the partial cure is greater than 20%.

Claims 39-41 depend from claim 38 and therefore from claim 17. Thus claim 17 is now the only independent claim.

FEE STATEMENT

Any fees which may be required as a result of the RCE, time extension, and amendments made herein are authorized to be charged to Assignee's deposit account number 07-0475. No fee is believed due for the IDS, but any fees required are authorized to be charge to the same account.

REFERENCES

The Examiner is respectfully requested to give consideration to the reference listed on PTO-A820/1449 attached hereto, and make this reference of record in the file wrapper for the present invention. This disclosure should not be construed as a representation that a search has been made, or that no other material as defined in 37 CFR 1.56(a) exists, or as an admission that the information cited herein is, or is considered to be, material to patentability as defined in 37 CFR 1.56(b).

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